

## Neurochemistry 1, 2, 3 (Mooney): Worksheet

### IONOTROPIC NEUROTRANSMISSION:

Receptor Type: \_\_\_\_\_

Examples:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Response (fast or slow): \_\_\_\_ EPSPs and \_\_\_\_ IPSPs

Onset: \_\_\_\_\_

Duration: \_\_\_\_\_

Structure: \_\_\_\_\_

Opening of channel: \_\_\_\_\_

Closing of channel: \_\_\_\_\_

### METABOTROPIC NEUROTRANSMISSION:

Receptor Type: \_\_\_\_\_

Response (fast or slow): \_\_\_\_ EPSPs and \_\_\_\_ IPSPs

Onset: \_\_\_\_\_

Duration: \_\_\_\_\_

Structure: \_\_\_\_\_

Steps in Activation/Inactivation:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Subtypes:

<b>G Protein</b>	<b>↑/↓</b>	<b>Effectors</b>
_____	_____	Adenylyl cyclase
_____	_____	Adenylyl cyclase
_____	_____	Phospholipase C
_____	_____	K <sup>+</sup> , Ca <sup>2+</sup> channels

Modes of G-protein operation:

1. \_\_\_\_\_
2. \_\_\_\_\_

### SECOND MESSENGERS + NEURONAL TARGETS

<b>Second Messenger</b>	<b>Enzyme of Synthesis + G Protein or Source</b>	<b>Target</b>

**ADENYLATE CYCLASE ACTIVITY:  $G_s$  and  $G_i$** 

	Stimulatory	Inhibitory
<b>G protein</b>		
<b>↑ or ↓ cAMP</b>		
<b>Receptor Examples</b>		

*Remember:* Cyclic nucleotide-gated (e.g. cAMP) channels levels affect the likelihood a channel will open  
 Protein kinases (e.g. PKA) phosphorylate proteins

SUBSTRATES OF NEURONAL PROTEIN KINASES		
Substrate	Example	Function

RECEPTORS ASSOCIATED WITH VARIOUS NEUROTRANSMITTERS		
Neurotransmitter	Receptor Type	Effect

Catecholamine Receptor Subtypes			
Neurotransmitter	Receptor Type	↑/↓	Effector
Dopamine	D1 or D5		
	D2, D3, D4		
Norepinephrine	$\alpha_1$		
	$\alpha_2$		
	$\beta$		

Acetylcholine Receptor Subtypes			
Neurotransmitter	Receptor Type	↑/↓	Effector
ACh	Nicotinic		
	m1, m3, m5		
	m2, m4		

Amino Acid Receptor Subtypes			
Neurotransmitter	Receptor Type	↑/↓	Effector
GABA (inhibitory)	GABA <sub>A</sub>		
	GABA <sub>C</sub>		
	GABA <sub>B</sub>		
Norepinephrine (excitatory)	AMPA/Kainic Acid		
	NMDA		
	Metabotropic		

Keep in mind still which are fast and slow acting

COMPARISON: NICOTINIC VS. MUSCARINIC RECEPTORS		
Receptor	NICOTINIC	MUSCARINIC
Agonist		
Antagonist		
Location		
Ionotropic/Metabotropic		
Fast or slow (EPSP or IPSP)		

PHARMACOLOGY OF CATECHOLAMINE NTs		
Drug	Functional Action	Neurochemical Action
Neuroleptic (Haloperidol)		
Reserpine		
Tricyclic Antidepressant; Cocaine		
MAO Inhibitor		
Amphetamine		

COMPARISON: GABA VS. GLYCINE		
Amino Acid	GABA	Glycine
Synthesized from		
Excitatory or Inhibitory		
Location		
Receptor/Channel		

PATHOLOGICAL CONDITIONS FROM NT IMBALANCE		
Condition	NT Imbalance	Location
Parkinson's Disease		
Schizophrenia		
Alzheimer's Disease		
Huntington's Chorea		
Myasthenia Gravis		